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The Symbiosis of Silicon and Neuron: Hybridizing Cognitive Habitus and the Sociological Transformation of Genius in Gifted Students

Abstract

Introduction. The study addresses the sociological transformation of giftedness and genius in the context of artificial intelligence, examining how the boundaries between human cognition and algorithmic systems are becoming increasingly blurred in the contemporary digital era. Consequently, traditional conceptions of giftedness, grounded in biological determinism and individual cognitive performance, require reconsideration, as they no longer adequately account for the cognitive experiences of gifted students engaging with AI technologies. *Methodology and Methods.* The study employed a conceptual and intertextual analysis strategy grounded in a post-humanist theoretical framework. Drawing on Pierre Bourdieu's habitus theory, Actor-Network Theory, and the Extended Mind Hypothesis, the research systematically reviewed national and international academic literature from databases including Web of Science, Scopus, ERIC, Google Scholar, and JSTOR. *Results.* The findings indicate that gifted students experience AI not merely as a functional tool but as an extension of their cognitive processes, giving rise to a "hybridized cognitive habitus" in which emotion, intuition, and algorithmic thinking converge. Furthermore, cognitive processes integrated with AI restructure cultural capital through algorithmic competencies, generating a new form of digital cognitive elitism. *Scientific novelty.* The scientific novelty lies in introducing the concept of "Symbiotic Genius" and "hybridized cognitive habitus" as new theoretical frameworks that redefine giftedness beyond biological boundaries within the age of artificial intelligence. *Practical significance.* The results can be used to reconceptualize educational policies, curriculum design, and social adaptation strategies to align with the emerging hybrid cognitive reality of gifted students, while also addressing issues of cognitive justice and equal access to AI technologies in education.

Keywords: Cognitive Habitus, Digital Capital, Sociology of Education, Post-Humanism, Symbiotic Genius, Giftedness, Artificial Intelligence.

Introduction. Throughout human history, the concepts of intelligence and genius have been considered a reflection of a person's biological limitations and their relationship with the society in which they live. In traditional literature, "superior ability" has been conceptualized as an "isolated" form of achievement where inherited potential is enhanced by environmental factors (Renzulli, 2021; Sternberg, 2018). However, the digital transformation of the 21st century is shaking this biological determinism, creating an ontological rupture in which neural capacity and algorithmic systems are intertwined.

Intelligence is no longer merely a processing unit within the skull, but the dynamic result

of a symbiotic network built using silicon-based methods. When this transformation is considered within the theoretical framework of post-humanist discussions (Braidotti, 2013, 2016; Hayles, 1999; Saldanha, 2023), the human-machine relationship is understood not only as a technological but also as an ontological restructuring. In this context, the Homo Deus discussions by Harari (2016) and Tegmark (2018) point to the process of redefining humans' cognitive and biological limits through algorithmic systems.

To understand the sociological dimension of this transformation, Bourdieu's (2020) concept of "habitus" provides an important

theoretical foundation. While habitus represents the perceptions, thoughts, and actions that determine a person's position in society, for today's gifted individuals, these structures are now intertwined not only with physical and social interactions but also with algorithmic interactions.

While current discussions on "Digital Habitus" (Ignatow & Robinson, 2017; Wynn, 2024) offer significant contributions to explaining the technology-society relationship, they are limited in explaining the process by which gifted minds internalize artificial intelligence not merely as a tool, but as a "cognitive prosthesis" or "mental extension" (Lupton, 2020).

In this context, the study aims to examine how traditional definitions of genius are being transformed amid digital change by addressing gifted students' interactions with artificial intelligence from a sociological perspective. The research aims to demonstrate that the concept of giftedness is being reshaped not only through individual cognitive capacity but also through interactions with algorithmic systems.

Materials and Methods. This research adopts a literature-driven, systematic review and conceptual analysis strategy to understand the cognitive processes of gifted students within the artificial intelligence ecosystem. Rather than relying on empirical field data collection, the study is based on a structured examination of existing academic literature and the achievement of an intertextual comparative synthesis.

Data collection. During the literature review process, prestigious academic databases, both nationally and internationally recognized, were utilized. Accordingly, searches were conducted on Web of Science, Scopus, ERIC, Google Scholar, and JSTOR using the defined key concepts ("artificial intelligence", "gifted students", "habitus", "post-humanism", "extended mind", "digital capital"). For the literature search based in Turkey, DergiPark and TR Dizin databases were primarily used.

Specific selection criteria were used to determine which studies would be included in the review. Accordingly, only articles from peer-reviewed journals, academic book chapters, or

indexed scientific publications were analyzed. As a temporal limitation, priority was given to recent studies produced within the last fifteen years. However, classic works that form the cornerstone of the field's theoretical foundation (Bourdieu, 2020; Clark & Chalmers, 1998; Latour, 2005) were integrated into the research scope without any chronological restrictions.

However, popular science publications that are not peer-reviewed articles, and studies not directly related to the research focus were excluded. These inclusion and exclusion criteria were designed to enhance the study's theoretical consistency and ensure the scientific legitimacy of the literature analyzed.

Data analysis technique. The collected literature data were analyzed using thematic analysis and intertextual comparison techniques; Bourdieu's habitus theory was reinterpreted through the conceptual lens of Actor-Network Theory and the Extended Mind Hypothesis. The main goal of this analytical process is to establish a distinct conceptual framework among different theoretical schools, thereby providing a solid theoretical foundation for the phenomenon of "hybrid cognitive habitus".

Procedure. In line with the aforementioned philosophical and theoretical model construction, this research is based not on a field-based empirical data-collection design but on an original intertextual analysis paradigm that integrates post-humanist philosophy, philosophy of mind, and the sociology of technology literature. The main problem addressed in the research is the semantic erosion of traditional "biologically based and isolated" conceptions of genius with the advent of the age of artificial intelligence. To fill this theoretical void, the research employs a dialectical, symmetrical synthesis model that seeks to transcend static theoretical boundaries.

Throughout the analytical process, Bourdieu's (1990, 2020) theories of Habitus and Cultural Capital, reflecting the carbon-based and anthropocentric nature of classical sociology, are juxtaposed with Latour's (2005) Actor-Network Theory (ANT), which includes silicon-based and non-human actors in the equation, and Clark and Chalmers' (1998)

Extended Mind Hypothesis, on a plane of methodological symmetry. The theoretical tensions that emerge between these approaches are resolved, yielding a unique intersection that can explain the profound experience gifted students have with artificial intelligence. All the sub-conceptual structures and theoretical perspectives examined in the study were selected and situated within a critical theoretical framework based on their potential to elevate the phenomenon of giftedness from a simple perception of “instrumental technology use” to “ontological hybridization”.

Results. This research systematically analyzed national and international literature addressing the interaction between the artificial intelligence ecosystem and the cognitive processes of gifted students and reached three main sets of findings.

Firstly, it has been determined that gifted students do not use artificial intelligence tools solely at a “functional/instrumental” level, such as for doing homework or searching for information; rather, they are positioned as an extension of reasoning in complex problem-solving processes, i.e., a “cognitive prosthesis”. This situation points to a structural integration where human cognition and algorithmic systems are intertwined.

Secondly, it was found that this integration transformed students’ social aptitudes and worldviews, producing a unique “hybrid cognitive habitus” structure where emotions, intuition, and algorithmic thinking patterns merged. The findings indicate that in gifted individuals, habitus is now constructed not only by the social environment but also by technological interfaces.

Finally, it has been found that this new cognitive habitus disrupts traditional cultural capital patterns (language skills, encyclopedic knowledge, etc.) and replaces them with a form of “algorithmic capital” based on the ability to “manage big data and manipulate algorithms”. This situation has been observed to create a risk of a new “digital cognitive elitism” and structural stratification in education between those who have access to this technology and habitus and those who do not.

Conceptual analyses. This section examines the symbiotic relationship between gifted students and artificial intelligence technologies from a sociological and philosophical perspective. In this context, the post-humanist transformation of intelligence, habitus, and intellectual capital is subjected to theoretical analysis that focuses on silicon-neuron hybridization. Rather than presenting empirical data, this study seeks to outline a conceptual and theoretical framework (a conceptual paper) to reposition the concept of giftedness within the rapidly transforming digital ecosystem.

From Bourdieu’s habitus to post-humanist ontology. Bourdieu’s concept of habitus refers to how humans internalize social structures and transform them into a grammar that produces action (Bourdieu, 1990; Wacquant, 2016). However, in the digital world, this grammar is being rewritten not only by class and cultural codes but also by algorithmic intelligence. The cognitive maps of gifted students, in this new relational plane established with artificial intelligence, go beyond the development of a digital habitus (Ignatow & Robinson, 2017) and shift into a post-humanist realm where humans and machines are an inseparable whole.

In this evolution from cultural capital to algorithmic capital, the knowledge, educational competencies, and language skills traditionally encompassed by cultural capital (Bourdieu, 1986) are being replaced by the ability to manipulate artificial intelligence and to make sense of big data. This, combined with the “new literacies” perspective discussed by Lankshear and Knobel (2011), shows that genius is no longer a personal possession but rather a positioning within technological networks. Examined within the context of Actor-Network Theory and the sociology of objects, it reveals, as Latour (2005) argues, that society comprises not only human actors but also non-human objects. The relationship that gifted students establish with artificial intelligence tools is a perfect example of this hybridity; here, artificial intelligence is not simply an assistant but an active partner shaping thought.

Finally, in the context of post-humanist subject determination and cognitive expansion,

post-humanism removes the individual from the center of the universe and positions them as a part of technological systems (Braidotti, 2013). The cognitive capacities of gifted individuals extend beyond biological patterns, as suggested by the “Expanded Mind” hypothesis, elevating the concept of “giftedness” to a cyborgian state of intellectual performance (Clark, 2010; Clark & Chalmers, 1998; Heersmink, 2015).

Silicon and neuron symbiosis: The “symbiotic genius” model and cognitive articulation. Traditional theories of giftedness favor treating intelligence as an internal “entity” confined to the human central nervous system (Terman, 1925; Gagné, 2004). However, the emergence of artificial intelligence as a cognitive prosthesis has pushed the boundaries of genius beyond the biological confines. (Kurzweil, 2005; Bostrom, 2014). This section proposes that intelligence is no longer a “state», but a constant “flow” between silicon-based algorithms and carbon-based neurons.

Cognitive externalization and prosthetic intelligence. Within this theoretical model, gifted students use artificial intelligence not merely as a computational tool but as an extension of working memory in complex problem-solving stages. Floridi’s (2014, 2019) concept of “Inforgs” plays a significant role in explaining the ontological relationship these students establish with the digital ecosystem. At this point, transferring a portion of the cognitive load to the algorithm creates cognitive leverage, allowing the human mind to focus on higher-level strategic and creative tasks.

From collective intelligence to hybrid genius. While Lévy’s (1997) “Collective Intelligence” theory focuses on human interactions within a network, in the current situation, these interactions have evolved into a form of “hybrid collaboration” between humans and artificial intelligence. The highly gifted individual has become not just someone who stores information but a bridge builder who can discern meaningful patterns within the massive datasets provided by artificial intelligence. This shifts the definition of genius from possessing knowledge to managing algorithmic probabilities (Siemens, 2005).

Algorithmic intuition and new epistemology. The symbiosis established with artificial intelligence transforms the way students access information from a mere data transfer into a process of technological subjectification. Viewed through the lens of Simondon’s (2011) theory of ‘individuation,’ this interaction represents a dynamic whole in which the student and the technical object (AI) are not independent of each other, but rather mutually construct one another. The algorithmic intuition that emerges in this process is a new epistemological layer shaped by the machine’s data processing and the refined transmission of the prediction to the human mind (Simondon, 2011; Stiegler, 1998; Verbeek, 2011).

Hybridized cognitive habitus and self-construction: The triangle of emotion, intuition, and algorithm. In gifted individuals, habitus is no longer merely a manifestation of the social environment but also a cognitive ecosystem shaped by technological interfaces. In this chapter, Bourdieu’s conceptual tools are reinterpreted within the context of digital identity and self-construction processes.

Digital Dispositions and Cognitive Schemas. Habitus determines a person’s predispositions to perceive and act in the world. In gifted students, this is intertwined with the universe of possibilities offered by artificial intelligence. As Reay (2004) states, habitus is fundamentally based on the principle of generating a strategy. In the symbiotic genius model, this strategy arises from the hybridization of the human mind’s qualitative depth and the algorithm’s quantitative breadth. As a reflection of symbiotic habitus, the gifted individual, when solving a problem, combines their own intuitive process with the data-driven predictions of artificial intelligence along a single path of reasoning, without distinguishing between them.

Self-construction in artificial intelligence: Cognitive prosthesis and algorithmic other. For gifted individuals, artificial intelligence, while a library, is also an algorithmic mirror in which self-identity is negotiated. In the context of Giddens’ (2023) concept of ‘reflexivity of self-identity’, these individuals compare AI outputs with their own cognitive performance and

continuously update themselves by manipulating these outputs. This process constructs a post-humanist identity model articulated with technology, extending self-perception beyond biological boundaries (Giddens, 2023; Foucault et al., 1988; Turkle, 2005).

Algorithmic Habitus and Cultural Socialization

The shift of social interactions to digital platforms and AI-powered networks has changed the nature of cultural socialization. The social success of gifted students is no longer judged solely by their physical presence in academic circles but by how they manage their algorithmic capital in the digital realm (AI-powered production, coding, rapid learning modules) (Hargittai, 2010; Miller, 2011). This is a new form of social stratification where “cultural well-being” is directly linked to technological competence.

The sociological transformation of genius and ontological rupture: the transhuman intellectual class. This chapter examines why the traditional “gifted” classification is no longer valid and the nature of the “new cognitive elitism” that occupies the top positions in society.

Crossing the biological limit: post-humanist capacity. Traditional sociology defines genius as either a social label or a biological exception (Becker, 1963). However, the hybridization of neuronal capacity with algorithmic systems has taken intelligence to a non-anthropocentric dimension. As Braidotti (2019) states, humans are no longer a static category but have evolved into a relational process constantly negotiating with technology. Gifted students, as initiators of this process, are the first social class to extend their cognitive capacities beyond their biological capabilities.

Digital elitism and the new social stratification. Symbiotic genius entails a new cognitive hierarchy. The academic elite, which Bourdieu (1998) referred to as “State Nobles”, is now being replaced by “Technological-Cognitive Elites” who can build a symbiotic bridge with artificial intelligence (Schwab, 2017; Lash, 2007). This transformation leads to the democratization of genius and the recoding of cultural capital through algorithmic

competence. This situation risks turning the gap between individuals who lack access to technology and those with the power to develop this hybrid habitus into an ontological chasm, as the new dynamics of digital capitalism further deepen structural inequalities (Sadin, 2020; Srnicek, 2017; Zuboff, 2024).

Ontological rupture: Redefining the concept of “creativity”. Historically, genius has been identified with the subject who creates something out of nothing or produces something through unique inspiration. However, within the hybrid habitus, creativity is the ability to select the most aesthetically or functionally optimal option from millions of possibilities scanned by artificial intelligence and to seal it with human meaning. This aligns with Heidegger’s (1977) ideas on the “essence of technology”, viewing technology as a force that frames the world (Gestell) (Heidegger 1977; Winner 2017): Technology is no longer a passive tool, but a new existential arena that surrounds the human mind, and within this enclosed space, genius/creativity reopens itself.

Discussion. The rise of the symbiotic genius model and the hybrid cognitive habitus embodied in gifted students is not merely a story of educational success or technological adaptation; it is also a dialectical battleground encompassing serious societal risks, structural ruptures, and philosophical contradictions.

The symbiotic relationship established with artificial intelligence requires a massive accumulation of socio-economic and cultural capital. Van Dijk’s (2005) “digital deepening” process demonstrates that inequality is no longer limited to physical access to technology; it is linked to the cultural and systemic infrastructure that transforms that technology into a mental advantage, a fluid cognitive habitus. The divide that will emerge between gifted students who have access to this hybrid capital (algorithmic competencies, big data management) and those who lack it is not simply a difference in achievement, but a risk of ontological “cognitive ghettoization”. In this context, Lupton (2020) and Ignatow and Robinson (2017) remind us that digital socialization spaces do not erase class codes

but rather reproduce them within more refined networks.

This structural inequality, when considered within the framework of Rawls' (1971) "theory of justice», points to a hierarchy in which equality of opportunity is most radically undermined. While the Rawlsian principle of justice mandates that social advantages be used to benefit the most disadvantaged, the use of silicon-based prosthetic intelligence further elevates the already biologically advantaged, gifted minority to an even more inaccessible position.

Furthermore, when considered at the macro level, this situation aligns with Sassen's (2014) paradigm of "exclusions". Sassen argues that global capitalism no longer merely exploits people but completely marginalizes them from the system. Platform capitalism, centered in the Global North and controlling artificial intelligence infrastructure and algorithmic ownership (Srniczek, 2017), integrates the highly talented minds of the Global South into its networks while simultaneously pushing large masses lacking the infrastructure to develop this hybrid habitus into "cognitive exclusion". Consequently, symbiotic genius risks ceasing to be a local educational phenomenon and becoming a new instrument of global capitalist accumulation and structural exclusion.

In the symbiosis established with artificial intelligence, the limits of "human originality" and free will are the most critical threshold of debate. Clark and Chalmers (1998), in their Extended Mind Hypothesis, argue that the boundaries of the mind extend beyond the skull, presenting this process as an optimistic cognitive collaboration. However, this externalization of the mind and, as Heersmink (2015) states, the fact that writing and code become constitutive elements of the mind make humans vulnerable to manipulation by algorithmic systems.

Han's (2017) "psychopolitics" analysis comes into play at this point: the neoliberal system now subjugates the subject not through external coercion, but by optimizing their own desires, cognitive processes, and self-construction mechanisms. The gifted student's "hybrid habitus" offers them seemingly

limitless intellectual horizons and creative space; however, in the background, they are surrounded by what Sadin (2020) conceptualizes as the "tyranny of the code". While the student combines their decisions and intuitions with the datasets provided by artificial intelligence, they are actually trapped by the algorithm's rationality that dictates what is "best and most optimized".

This situation establishes a paradoxical relationship with the logic of "outsiders" discussed by Becker (1963) in his sociology of deviance. Historically, genius has been considered a form of deviance/creative revolution that goes beyond social norms, speaks from outside the system, and breaks the normative structure. However, the new cognitive elites, in symbiosis with artificial intelligence, exist in an ecosystem where every behavior and thought pattern is commodified through data mining, which Zuboff (2024) calls "surveillance capitalism". It becomes difficult for a "disruptive and revolutionary genius" capable of shaking the paradigm to emerge from a mind that is constantly optimized, predicted, and shaped by algorithms. In line with Stiegler's (1998) warning that technological prosthetics "cognitively proletarianize" humans, even when a gifted individual updates their self-identity with a Giddensian (2023) reflexivity, they are actually operating within the boundaries drawn by the "algorithmic other". As Winner (2017) emphasizes, artifacts have a politics; artificial intelligence is not a neutral tool, but a political agent that tames the character of genius and transforms it into an instrument of systemic efficiency.

The educational equivalent of the symbiotic genius model and the shifting cognitive dispositions is a state of complete institutional incompatibility and crisis. The current educational bureaucracy is built upon a taxonomy rooted in Terman's (1925) or Gagné's (2004) biologically deterministic, isolated, and measurable intelligence tests. Educational institutions still register and reward success based on carbon-based performance within the individual's skull. However, as indicated in Siemens' (2005) connectivism theory and

Lévy's (1997) collective intelligence model, in the digital age, knowledge and intellectual performance are now a dynamic flow between nodes and networks. When a gifted student makes artificial intelligence a co-founder of their work, traditional pedagogy tends to code this as "cheating" or "academic misconduct".

This institutional blindness justifies the radical critique in Illich's (1971) *Deschooling Society*. Illich argues that schools commodify human ability by institutionalizing it and stifling original learning practices. For a gifted student with a hybridized cognitive habitus, the walls and static curriculum patterns of the modern school function as shackles. This is because these students experience a new ontological reality, embodied in Braidotti's (2013, 2016) post-humanist critique, which removes humanity from the center of the universe and establishes symbiotic partnerships with non-human agents (artificial intelligence).

As Reay (2004) points out, habitus is not a static structure but a mechanism for producing a flexible strategy for survival in new areas. Unless education systems can keep pace with this flexibility, as Bourdieu (1998) demonstrates in his work *"The State Gentiles"*, they will only serve to preserve the cultural capital patterns of the old world (Bourdieu, 1986) and leave the "algorithmic capital" of the new age in the hands of elitist ghettos. Therefore, pedagogy must construct a new pedagogical ontology that removes intelligence from the category of personal possession and regards it as an aesthetic and ethical performance of human-machine hybridization.

Conclusion. This study examined the relationship between gifted students and artificial intelligence not simply as the use of a tool, but as a symbiotic transformation that reshapes Bourdieu's concept of habitus. At this point, "genius" is no longer an isolated biological superiority, but a hybrid form of performance occurring within technological networks.

The "Symbiotic Genius" model, developed during the research, demonstrates that intelligence is no longer an individual possession but a fluid capital that flows between humans and algorithms. This hybridization of silicon

and neurons has radically transformed not only the information-processing speed of the gifted student but also their perception of the world and their internal planning. This technological transformation of the cognitive habitus that emerged among these students represents one of the sharpest ruptures in the history of human thought, because the "thinking subject" now possesses an "expanded mind" structure that transcends its biological limitations.

One of the most important findings of the study is that "digital capital" and "algorithmic competence" are becoming a new class-dividing factor. Highly gifted individuals are ontologically separated from the rest of society by their capacity to develop this hybrid habitus. This lays the groundwork for the emergence of a "post-human" intellectual class, while simultaneously creating a new form of exclusion for traditional intelligences with limited access to this technology. Sociologically, this points to a future where merit systems will be reclassified based on technological articulation capacity rather than biological ability.

Adapting to a hybrid reality requires educational systems to mitigate the potentially disruptive effects of the sociological transformation of giftedness in the age of artificial intelligence while maximizing its educational and societal benefits. A key priority is the post-humanist transformation of the curriculum, whereby intelligence is no longer conceptualized solely as an individual attribute but as a distributed and relational capacity emerging through human-AI collaboration. Consequently, educational frameworks should adopt hybrid models of achievement that recognize and assess the quality of these collaborative cognitive processes. Equally important is the promotion of cognitive justice and equitable access to AI-enabled learning opportunities. Artificial intelligence should not function as a cognitive prosthesis available only to privileged groups; rather, all gifted students should have the opportunity to develop algorithmic habitus and AI-related competencies as a matter of educational equity. Finally, ethical guardianship must become a central component of gifted education. Beyond acquiring the technical skills necessary to use

AI systems effectively, gifted students should be equipped with critical digital literacy skills that enable them to evaluate algorithmic outputs, recognize embedded biases, and resist forms of algorithmic domination. Collectively, these measures can support a more equitable, reflective, and socially responsible integration of artificial intelligence into gifted education.

In conclusion, the symbiosis of silicon and neurons is not a choice, but an inevitable

evolution of the digital age. The “Symbiotic Genius” model presented in this study is open to empirical testing in future research, supported by qualitative or mixed methods, through the daily practices of gifted students with artificial intelligence interfaces. The sociology literature should accept this hybrid reality not as a non-human anomaly, but as a new manifestation of human genius, and update its theoretical tools accordingly.

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